

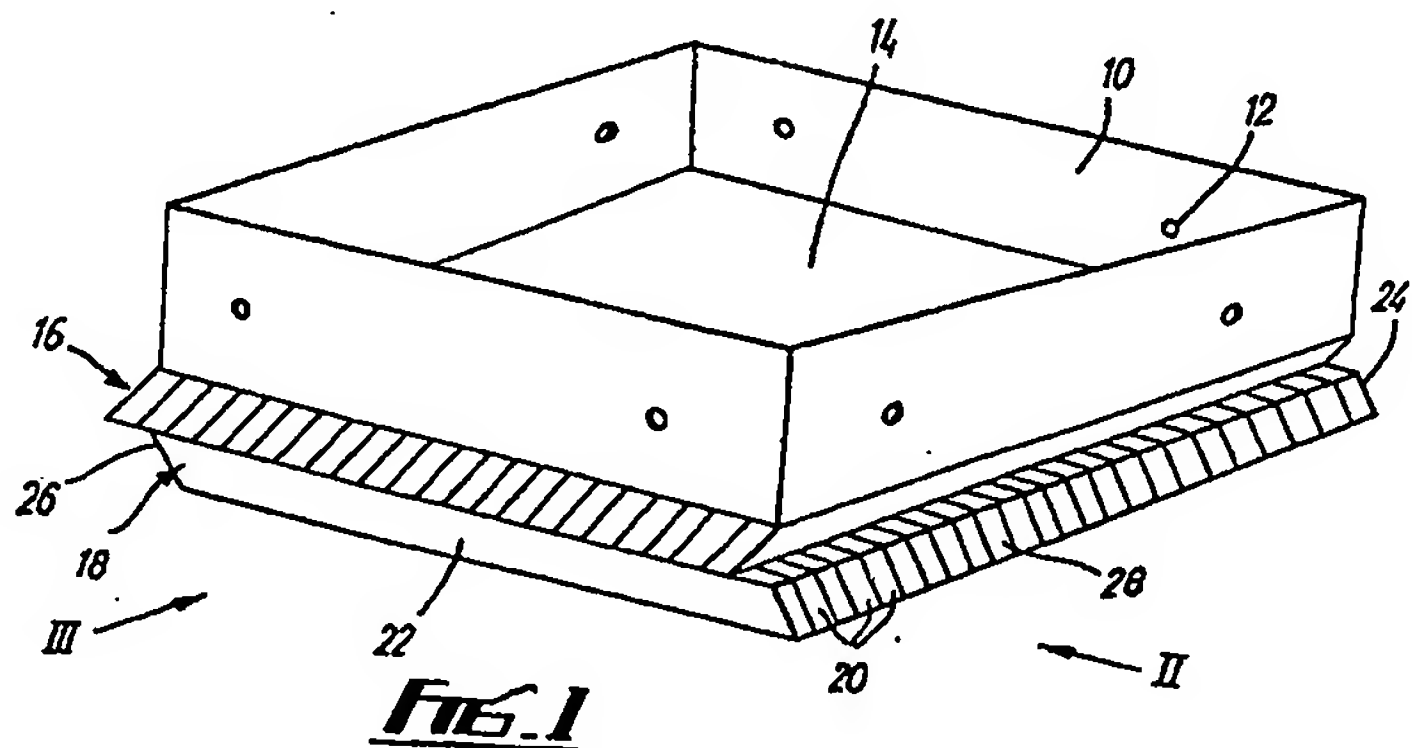
(12) UK Patent Application (19) GB (11) 2 058 311 A

- (21) Application No 8028962
(22) Date of filing 8 Sep 1980
(30) Priority data
(31) 7931586
(32) 12 Sep 1979
(33) United Kingdom (GB)
(43) Application published
8 Apr 1981
(51) INT CL³
F27D 1/00
(52) Domestic classification
F4B 35F6 35H FC
F2X 7C 7D1 7D4 7M
(56) Documents cited
GB 2023269A
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GB 1396724
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(58) Field of search
F4B
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(54) Modules for construction of furnaces

(57) A construction module for use with other similar modules in the assembly of a furnace comprises a backing (14) which may be a metal mesh supported on a frame (10) and two layers of ceramic fibre insulation material (16, 18) supported e.g. by an adhesive on the mesh. At least the layer on the furnace side is formed from a plurality of strips formed by making transverse cuts in an elongate blanket of felted ceramic fibres in

which the fibre orientation is predominantly parallel to the longitudinal axis of the blanket. The cuts are made at an angle to the face of the blanket and the strips are arranged in uncut face to uncut face relationship, so that the fibres are orientated at an acute angle to the face of the backing and the surface exposed to the furnace interior is formed substantially of fibre ends. A backing insulation of mineral wool may be provided on the face of the mesh remote from the ceramic fibre layers.



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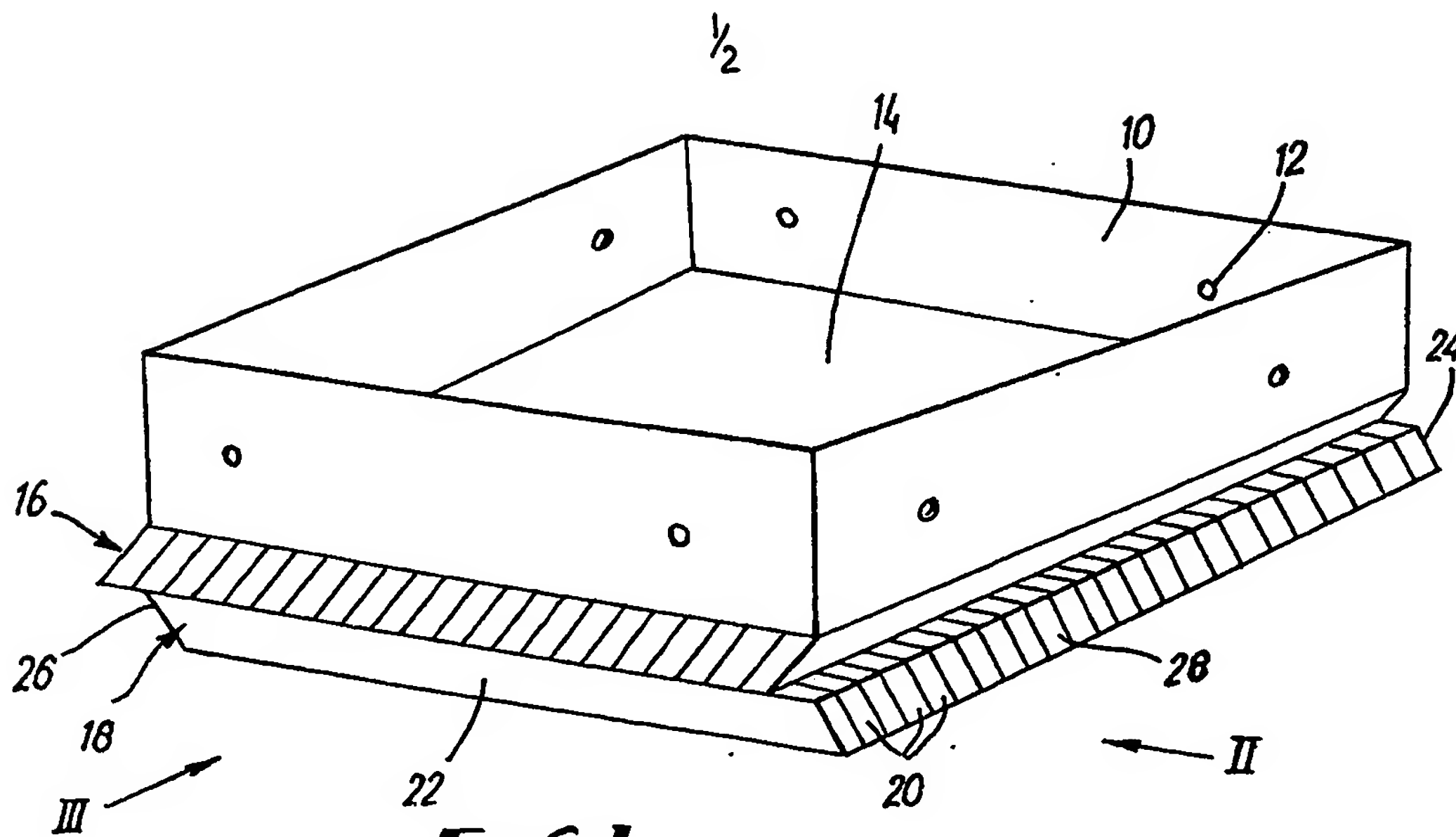


FIG. 1

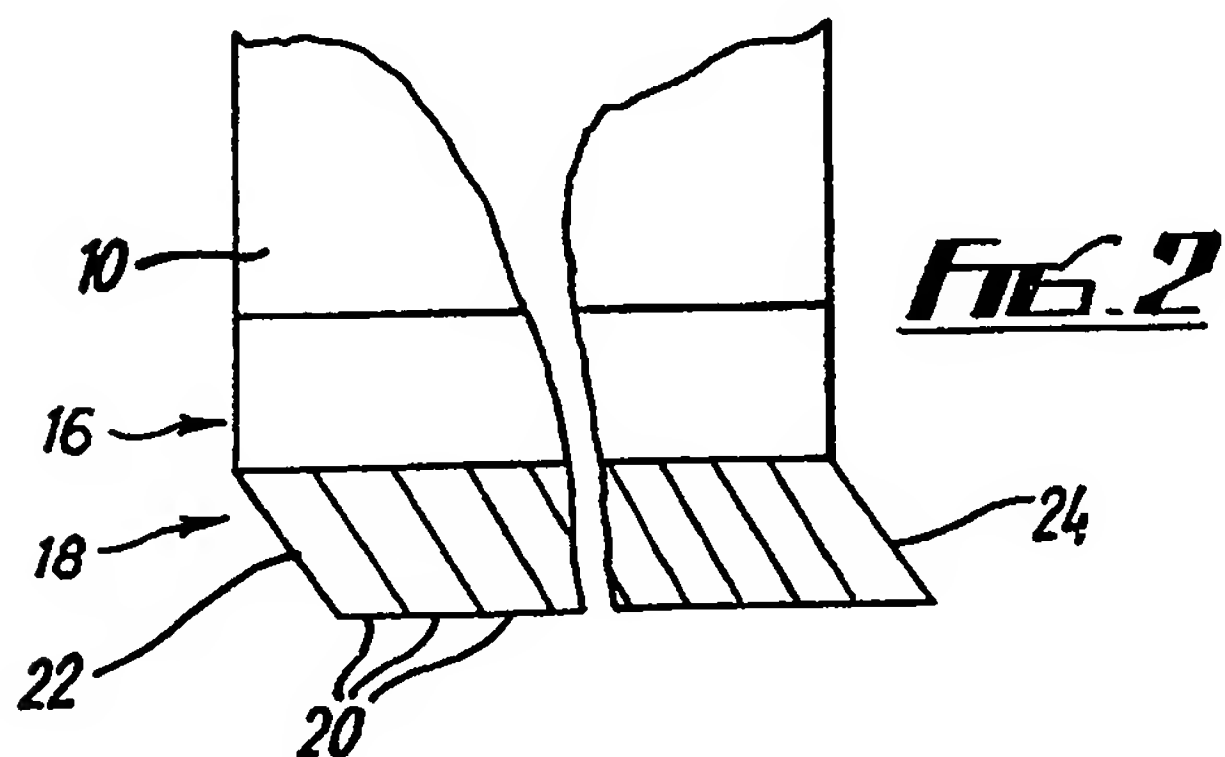


FIG. 2

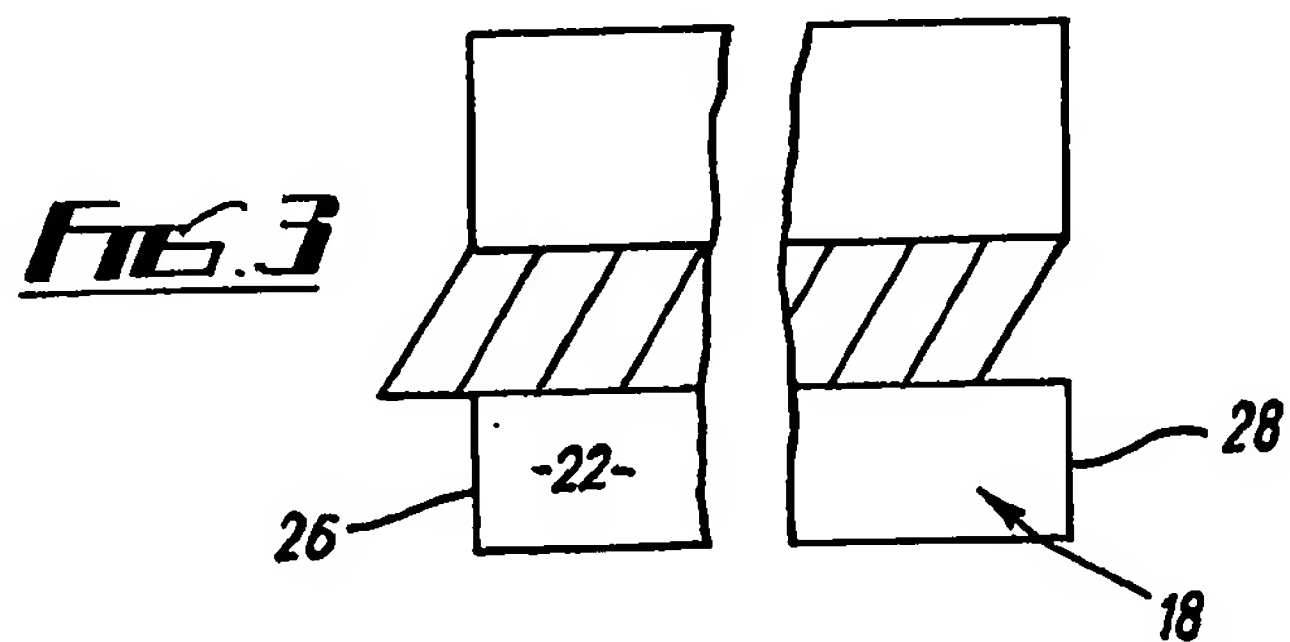
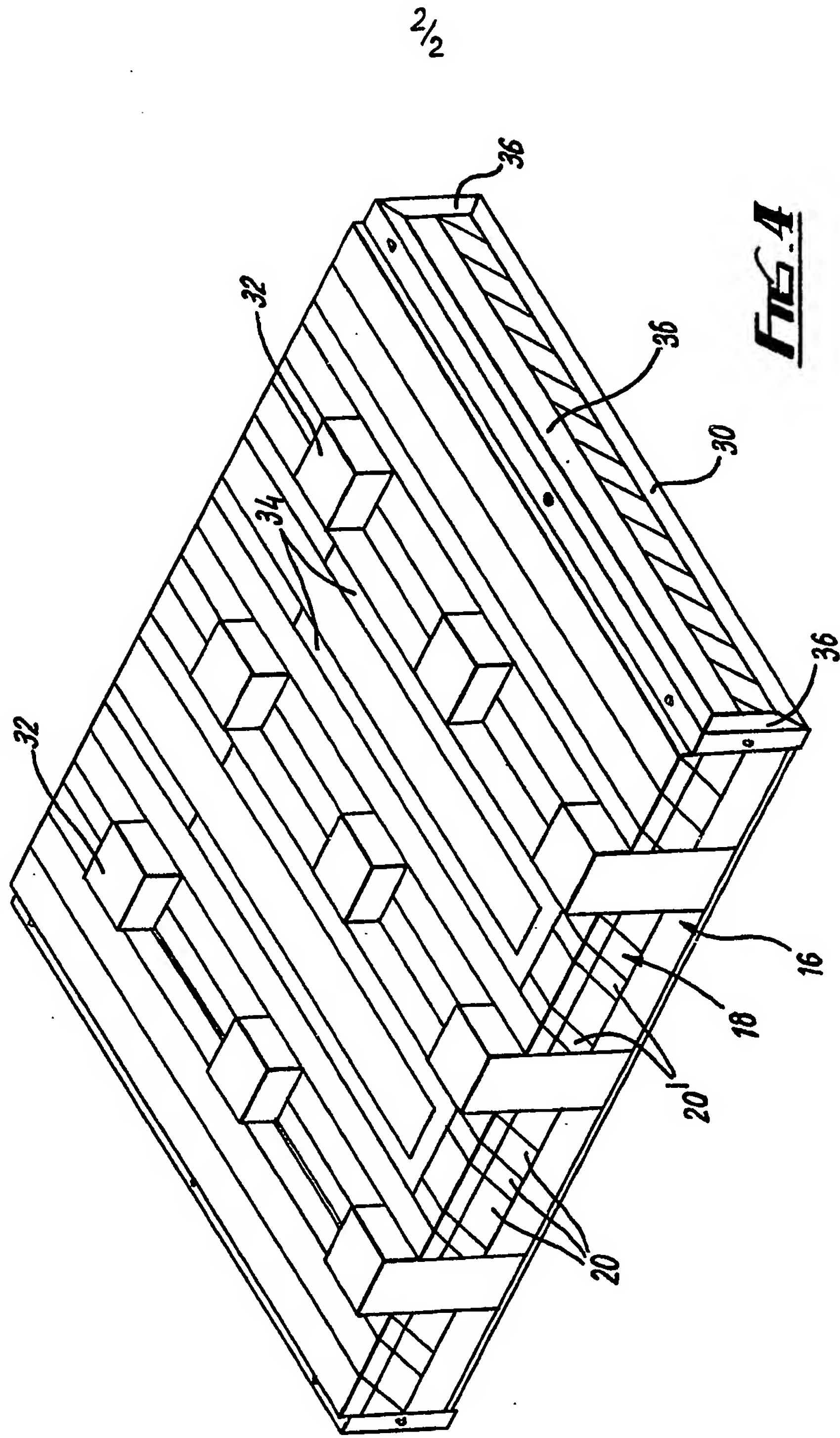


Fig. 3



SPECIFICATION

Improvements in or relating to kiln construction

The present invention concerns improvements in or relating to construction elements or modules for use with other similar modules in the manufacture of kilns, furnaces and the like.

It has been known in the past to manufacture kilns (which term when used in this specification is intended to mean also furnaces, ovens and other insulated enclosures) from similar elements of corresponding dimensions such that by varying the number of elements employed kilns of differing sizes can be produced. Certain of these construction elements have been relatively heavy and correspondingly cumbersome to handle in that they have comprised a steel framework surrounding a cast refractory material.

It is an object of the present invention to obviate or mitigate these disadvantages.

According to the present invention there is provided a construction element for use with other similar elements in the manufacture of kilns, the element including backing means and an insulating material arranged on one side of said backing means, the insulating material comprising ceramic fibres, the fibre orientation lying at an acute angle to the face of said backing means such that the surface of the lining exposed to the kiln interior is formed substantially of fibre ends.

Preferably the insulating material comprises first and second lining layers.

Preferably said second lining layer is made up from a plurality of strips formed by making transverse cuts in an elongate blanket of felted ceramic fibres in which the fibre orientation is predominantly parallel to the longitudinal axis of the blanket, the cuts being made at an angle to the face of the blanket and the strips being arranged in uncut face to uncut face relationship.

The first lining layer may also be formed from ceramic fibres and may be a blanket arranged with the fibres thereof substantially parallel to the face of the backing means or comprises a plurality of strips arranged in a manner similar to that described in the preceding paragraph.

Preferably the construction element is rectangular in shape and at least a pair of opposed edges of the second lining layer are parallel and arranged at an acute angle to the face of the backing means. The other two opposed parallel edges are arranged substantially perpendicular to the face of the backing means or may be arranged at an acute angle to said face.

Where the first insulating layer is manufactured from strips in a manner similar to the second layer it is preferable that the strips of the first layer run transversely to the strips of the second layer.

The opposed edges of the first insulating layer alongside said first pair of opposed edges of the second insulating layer that is said angled edges are preferably arranged perpendicularly to the face of the backing means but they may be arranged at an angle thereto. Accordingly the other two opposed parallel edges of the first insulating layer

are preferably arranged at the said acute angle or may be perpendicular to the front face of the backing means.

There may be more than two insulating layers.

The backing means may comprise a steel frame having mounting means associated therewith supporting a mesh on which said insulating layers are mounted. A backing insulation of mineral wool may be provided on the face of the mesh remote from the insulating layers. Alternatively the backing means may include a mesh supported on angle iron support means having suspension devices associated therewith.

Preferably the insulating layers are fixed to each other and to the mesh by a suitable adhesive.

In a modified form of the invention the element may be provided with only an outer insulating layer.

An embodiment of the present invention will now be described by way of example only with reference to the accompanying drawings in which:

Fig. 1 shows a perspective view of a construction element for a kiln;

Figs. 2 and 3 show end views of an element thereof in the direction of arrows II and III of Fig. 1, and

Fig. 4 is a perspective view of a modified element.

A construction element or module comprises a rectangular sheet steel framework 10 having a plurality of holes 12 therethrough, the location of the holes being such that a similar module can be brought alongside any of the sides of the framework and fixed thereto by fixing means passing through said holes 12. A layer of mesh (not shown) is attached to the underside of the framework 10 and mineral wool 14 is supported on the mesh within the framework 10. Two insulating layers 16, 18 are attached to the mesh on the side thereof intended, in use, to form the interior of the kiln. The second or outer insulating layer 18 is manufactured from a plurality of strips 20 arranged in side-by-side relationship, the strips having been cut from a blanket of felted ceramic fibres in which the fibre orientation of the blanket is substantially parallel to its longitudinal axis. The strips are cut from the blanket transversely of its longitudinal axis, the angle of cut lying at, for example, 46° to the face of the blanket, and the strips, which each have the same width, are arranged in uncut face to uncut face relationship with their faces substantially parallel so that a cut face formed by fibre ends is exposed to the interior of the kiln. With an arrangement of this nature a pair of opposed edges 22, 24 of the first insulating layer 18 are arranged at an acute angle e.g. 46° to the face of the mesh, the remaining opposed edges 26, 28 of this layer being perpendicular.

In the embodiment shown in the drawing the first lining layer 16 is formed in a manner similar to the second lining layer from strips cut at an angle from a blanket of ceramic fibres, the strips of the first layer being arranged such that their axis is transverse to those of the second layer. Thus, as shown in Figs. 2 and 3 one pair of opposed edges

of the composite insulating layer will have an inner perpendicular portion and an outer angled portion; the other pairs of edges having an inner angled portion and a perpendicular outer portion.

- 5 It will be realised that with construction elements or modules manufactured in accordance with this embodiment when two or more modules are interconnected there is an overlapping joint at the abutting edges of the composite insulating layer:

10 The strips forming the insulating layers 16, 18 are held together, to the mesh and to the strips of the other layer by a suitable adhesive.

- 15 As the second or outer insulating layer 18 is exposed to the kiln gasses it is formed from a high temperature insulating material while the first layer, which is subjected to lower temperatures may be formed from a lower temperature insulating material.

- 20 Various modifications can be made without departing from the scope of the invention, for example the first lining layer may be cut from a blanket of felted ceramic fibres in such a way that in position on the mesh the orientation of the fibres is substantially parallel to the face of the mesh. The two opposed edges of the second and first lining layers described above as lying perpendicular to the mesh may be cut to lie at an angle to the face of the mesh such that a similar V-notched edge is provided around the periphery of the element.

- In a further modification where a module is intended for use in the roof of a kiln as opposed to the sides or ends thereof, the plate steel frame 10 may be dispensed with and substituted by a supporting structure of angle irons or box section to which the mesh is fixed, suspension means being provided on the angle irons.

- 40 There may be more than two insulating layers, and any layer or layers additional to those described above will be arranged between the second or outer layer and the backing means. The additional layer or layers can take any of the forms described above in connection with the first layer.

- 45 Further, an element may be provided with only one outer insulating layer.

- In the modification shown in Fig. 4, which is an element for use as part of the base of a kiln the insulating layers 16, 18 have the same general form as those described with reference to Figs. 1, 2 and 3. The framework of this element, however, is assembled from angle iron 30. The angle iron forms a rectangle which is used in place of the framework 10 shown in Figs. 1 to 3, but at those edges of the element where the neighbouring element is not coplanar therewith, for example the right hand edge shown in Fig. 4 where the neighbouring element is arranged perpendicular to the element shown additional members 36 are provided to facilitate the assembly of the elements. Refractory bricks 32 are formed in the base to provide load supports and certain strips 20' of the first insulating layer 18 have a greater width than the remaining strips such that they form grooves or channels 34 for electrical heating

elements.

CLAIMS

1. A construction element for use with other similar elements in the manufacture of kilns, the element including backing means and an insulating material arranged on one side of said backing means, the insulating material comprising ceramic fibres, the fibre orientation lying at an acute angle to the face of said backing means such that the surface of the lining exposed to the kiln interior is formed substantially of fibre ends.

2. A construction element as claimed in claim 1, in which the insulating material comprises first and second lining layers.

3. A construction element as claimed in claim 2, in which said second lining layer is made up from a plurality of strips formed by making transverse cuts in an elongate blanket of felted ceramic fibres in which the fibre orientation is predominantly parallel to the longitudinal axis of the blanket, the cuts being made at an angle to the face of the blanket and the strips being arranged in uncut face to uncut face relationship.

4. A construction element as claimed in claim 2 or 3, in which the first lining layer is formed from ceramic fibres.

5. A construction element as claimed in claim 4, in which the first lining layer is a blanket arranged with the fibres thereof substantially parallel to the face of the backing means.

6. A construction element as claimed in claim 4, in which the first lining layer comprises a plurality of strips formed by making transverse cuts in an elongate blanket of felted ceramic fibres in which the fibre orientation is predominantly parallel to the longitudinal axis of the blanket, the cuts being made at an angle to the face of the blanket and the strips being arranged in uncut face to uncut face relationship.

7. A construction element as claimed in any one of the preceding claims which is rectangular in shape.

8. A construction element as claimed in claim 7, in which at least a pair of opposed edges of the second lining layer are parallel and arranged at an acute angle to the face of the backing means.

9. A construction element as claimed in claim 8, in which the other two opposed parallel edges are arranged substantially perpendicular to the face of the backing means.

10. A construction element as claimed in claim 8, in which the other two opposed parallel edges are arranged at an acute angle to said face of the backing means.

11. A construction element as claimed in any one of claims 6 to 10, in which the strips of the first layer run transversely to the strips of the second layer.

12. A construction element as claimed in any one of claims 6 to 11, in which the opposed edges of the first insulating layer alongside said first pair of opposed edges of the second insulating layer are arranged perpendicular to the face of the backing means.

13. A construction element as claimed in any one of claims 6 to 11, in which the opposed edges of the first insulating layer alongside said first pair of opposed edges of the second insulating layer are arranged at an angle thereto.

14. A construction element as claimed in claim 12 or claim 13, in which the other two opposed parallel edges of the first insulating layer are arranged at the said acute angle.

15. A construction element as claimed in claim 12 or claim 13, in which the other two opposed parallel edges of the first insulating layer are perpendicular to the front face of the backing means.

16. A construction element as claimed in any one of the preceding claims in which there are more than two insulating layers.

17. A construction element as claimed in any one of the preceding claims, in which the backing means comprises a steel frame having mounting means associated therewith supporting a mesh on which said insulating layers are mounted.

18. A construction element as claimed in claim 17, in which a backing insulation of mineral wool is provided on the face of the mesh remote from the insulating layers.

19. A construction element as claimed in any

one of claims 1 to 16, in which the backing means includes a mesh supported on angle iron or tubular support means.

20. A construction element as claimed in claim 19, in which suspension devices are provided on the support means.

21. A construction element as claimed in any one of the preceding claims in which the insulating layers are fixed to each other and to the mesh by a suitable adhesive.

22. A construction element as claimed in any one of claims 3 to 21, in which certain strips have a greater width than others whereby said wider strips define with a narrower strip a groove for the reception of an electrical heating element.

23. A construction element as claimed in any one of the preceding claims, in which load bearing supports are provided protruding through the insulating layer.

24. A construction element substantially as hereinbefore described with reference to Figs 1 to 3 or Fig. 4 of the accompanying drawings.

25. Any novel subject matter or combination including novel subject matter herein disclosed, whether or not within the scope of or relating to the same invention as any of the preceding claims.